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The New Gas Works.

THE OLD AND THE NEW IN CONTRAST

THE IMPROVEMENTS AND THE VAST DIFFERENCE.

[The following item will be read with interest as showing the march of improvement in the manufacture of gas in the far west:]

We have kept our readers posted continually in regard to the progress of construction at the new gas works, and, therefore, few will be surprised, this morning, when we state that the works are to commence operations to-day, and that the gas furnished to-morrow night will be from the new gasometer.

The new works are worth a visit. There they are, the new and old, side by side, and there you can see how they made gas eighteen years ago when the old works were built—and have made it ever since at Davenport—and the great improvements in the process adopted for the new works. The new works are among the most complete in the country. In truth, no city in the Union of the size of Davenport can boast of such works. When Mr. T. J. Gaylord, who really owns the work, commissioned the well known gas engineer, Capt. R. T. Coverdale, to build the works, he instructed him to make them "model works." Mr. C. has carried out the instructions completely. The site of the new works is on the lots on the north side of Third street, between Le Claire and Farnam, adjoining the old works on the east. The cost of the works when fully completed, will reach the sum of $55,000.

The new works consist of a block of four buildings, fronting on Third street, viz.—Retort House, Exhausting Room, Purifying House, and Lime House. In the yard are the gasholder, tar-cistern, and a coal house.

The retort house is 79 feet long, 27 feet wide, and 28 feet high. It has wrought iron truss roof, covered with corrugated iron. The several doors are arched, and the ventilating windows are circular, all having transoms. The machinery consists of five fire benches or ovens, each containing five retorts. There is room for several more benches, which can be built as the wants of our growing city demand. All the arches, inside linings and front brick work, are of No. 1 fire-brick. The retorts are of clay, and weigh 1,600 lbs. each. Until recently the retorts used in these works were of iron, cost twice as much as the clay ones, and did not last half as long.

There are also in this house, a horizontal boiler and a steam pump for supplying the works with water, and an independent boiler feeder. The buildings are heated throughout by steam.

The gasholder is 60 feet in diameter and 18 feet deep. Its ascension tracks are supported by six cast iron columns, and six wrought iron girders. Its tank is 62 feet 6 inches in diameter, and 10 feet deep.

There is also a lime house eighteen feet by twenty-five feet and sixteen feet high, and a substantial coal house, about 80 feet long, 30 feet wide and 15 feet high, which will hold about 1,500 tons of coal.

The retort house, exhauster room, purifying house, and coal houses are all built of hard brick, neatly jointed, and cannot be excelled for workmanship in Davenport, or any other gas-using city in the country. There is a fine cut stone water-table all around the buildings, the base work of stone being carried up to high-water mark.

We are informed that Mr. E. B. Baldwin, the efficient Secretary and Superintendent of the works, has had charge of the building department for Mr. Gaylord, and it reflects great credit on his management.

The gasholder, purifiers, center seal, and roof were furnished by Geo. Stacey & Co. of Cincinnati. The engine, valves, and connecting pipe work, by William Kirkup & Son, Cincinnati; the exhauster by the Smith & Sayre Manufacturing Co., New York; the governor, pressure and vacuum gauges, by Harris, Griffin & Co., Philadelphia; the retorts, piers, saddle tile and fire tile by the firm of Kreischer & Son, New York; the polished valves and bye-pass valve and exhauster connectors, by Messrs. Dodge & Co., Covington, Ky. All the connections, pipe, wrought iron work, and castings for retort-house were furnished by the Gaylord Iron and Pipe company.

The Oxyhydric Light in New York.

The plan consists, in general terms, in supplying to ordinary street gas a quantity of oxygen, with the addition of a carburetting apparatus, through which the former is led before meeting the oxygen. In Paris where the system first received a public trial upon several of the principal boulevards, it was unfavorably reported upon by commissioners appointed to examine into its merits as an illuminant for street lighting. The grounds for this unfavorable opinion were stated to be the impossibility of operating the system over a large extent of ground, its considerable expense, and the complication of the process, necessitating, as it does, the laying of two complete lines of pipes, and the application of the carburetting apparatus. In New York this same process has recently received quite an extended application, for the purpose presumably of experiment; and from the comments of the local press, it appears to have met with great favor. The opinion is expressed that, though the item of expense is really a drawback against the general introduction of the system for street lighting, the great superiority of the light which it affords, is an advantage which more than counterbalances it. In Madison square a number of burners upon this plan have recently been placed, and afford a light which pales that of all others in their neighborhood.

It is, however, for interior illumination of large buildings that the plan has received unlimited praise, The large hall used by the American Institute during its late fair, was illuminated by this process, and the light afforded was, we are told, far superior to that formerly obtained from twelve hundred burners of common gas. Its intensity and whiteness were clearly manifested in rendering the colors of the great variety of articles there exposed distinctly recognizable, and in adding greatly to the brilliancy and cheerfulness of the scene.

While we wish to avoid, in the absence of any opportunity for personal inspection, expressing an opinion as to the practical adaptability of the process upon a large scale for street illumination, where its drawbacks appear to us to have been underrated by our contemporaries, we heartily concur in the flattering opinions expressed of its superiority and fitness for the interior illumination of large buildings. From a sanitary point of view also, there can be no doubt that the remarkable purity and whiteness of the light is vastly more healthful than the ordinary gas light, which, by its side, appears as a dull red, dirty flame, throwing off volumes of soot.—*Dr. Wahl.*

The Water Supply of the West.

We have several times called attention to the growing scarcity of water in the west and northwest. Some years since the Illinois Central Railroad Company issued a very ably written pamphlet, written, we believe, by its then president, Mr. Osborne, calling attention to the facts that, while west of the Mississippi, and especially west of the Missouri, there must be very great scarcity of water, in Illinois no such scarcity of water could possibly exist, because of the many large streams traversing the State, and the numerous living springs existing in its northern and northeastern counties.

Mr. Osborn's theory as respects the countries west of the Mississippi proved correct, as drouths in Kansas, Nebraska, portions of Iowa and Missouri have since demonstrated. Nevertheless, it was incorrect to a considerable extent, as respects this State. Portions of Illinois have, for three or four years past, suffered very severely from droughts, while the entire State has been more or less unfavorably affected. So that whether it is the increasing dryness of the West and Southwest that is reflecting upon our State, it is certain that the cultivation of the prairie and the denudation of the country of timber are having the effect upon the entire Northwest which Mr. Osborne in 1859 and 1860 predicted for the country west of the Mississippi. This would tend to prove that whatever remedies are proposed for one section of the West

must have a beneficial effect on the whole, and that whatever evils are produced by a certain mode of cultivation in one section of it must sensibly affect the whole unfavorably. In this connection we notice that a late Janesville (Wis.) *Gazette* records a lamentable scarcity of water in that region, and calls attention to the fact that the supply is getting shorter every year. Wells which years ago gave an abundant supply during the driest seasons are now exhausted. The Rock river, which a Mississippi steamer ascended to Janesville in 1836, has dwindled down to a mere rivulet, with scarcely volume enough to float a yawl. Water famines on Rock Prairie are frequent and distressing. —*Paper Trade Journal, from Chicago Paper.*

The Loiseau Fuel.

We are glad to see that this invention is not to share the fate of its predecessors. Mr. Loiseau deserves success, if any man of energy ever did. The *Mauch Chunk Coal Gazette* publishes the result of an exhibition of the artificial fuel to a large party, composed of the directors and principal stockholders of the Lehigh Coal and Navigation Campany, at the Mansion House. It was burning in all the grates and stoves. At a meeting of the Board the following day, the President, Mr. E. W. Clark, was authorized to erect machinery and apply the Loiseau fuel to the works at Nesquehoning. Only 5 per cent. of clay is added to the slack, and the coating is perfectly water-tight.

To refresh the memory of our readers, we add a few paragraphs from the editorial of the *Gazette:*

In Europe the utilization of bituminous coal dust has been tried with success. Two systems were in use, the first one utilizing the coal dust by simple compression, without the use of any cement, and the other one utilizing it by agglomeration, or uniting the particles with a cement.

The first system was applied in England, at a considerable expense, without success, as far back as 1849–50, by Buckwell and by Bessemer. It was also tried in a different way in France, by Evrard and by Barculier, in 1852 and 1855; the results were not successful; the machinery was too expensive and it consumed almost as much ordinary coal for its manufacture as it would produce.

The cementing process met with more success. The most singular materials were used at first as cohesive matter. Damaged flour, starch, animal blood, the dregs of sugar factories, the remains of lubricating oil, gum arabic, solutions of glue, sweepings of highways, cowdung, sulphur, ammoniæ salt, copperas, alum, broken glass, oil cake, cork cuttings, bran, tanners' bark, lime, chalk, plaster, potatoes, and sweepings of highways are among the cements patented. It seems unnecessary to say that these ridiculous attempts to solidify coal dust were failures.

Potters' clay, coal tar, and its derivative, soft and dry pitch, are the only cements which have received, in spite of some defects, a practical sanction. Clay, and soft and dry pitch are still used as cements in England, France, Germany, Belgium, Spain, and even Italy.

Artificial fuel, made in Europe from bituminous or semi-bituminous coal dust, cemented by soft or dry pitch, is entirely unfit for domestic purposes, on account of the smell and smoke. In the last century, a mixture of coal dust and clay, pressed by hand in the shape of balls, was used for domestic purposes, in England, in Germany, in the North of France, and in Belgium, and is still in use at the present day. The first machine erected to manufacture coal dust and clay into solid lumps by mechanical pressure, was the invention of a French engineer, named David, and was erected in 1850 at Hamsur Sambre (Belgium). Another machine, invented by Simon Baudry, was erected in 1861, at Tamines sur Sambre (Belgium), and is still working to-day. Several other factories have been erected in England and Germany, where the same process is applied. Twenty per cent. is the percentage of clay mixed with the coal dust, and the coal manufactured cannot stand exposure to moisture. All the attempts made in this country to manufacture a marketable artificial fuel from the refuse of the coal have been failures, and it was considered quite an impossibility ever to make fuel from the anthracite coal slack. In this field of science and industry, a success at last must be recorded. The efforts of Mr. E. F. Loiseau, a French gentleman, whose process has been described at length in our columns, have been crowned with great success All those who have witnessed during last week the fine burning qualities of Mr. Loiseau's coal at the Mansion House, and at the same time its lasting qualities, agree that it is a perfect success.—*Exchange.*

Chemical Repertory.

No. 85.—February 3, 1873.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

616. Submarine Post between England and France.—E. Martin, in *Les Mondes*, suggests a plan, which consists in the use of a narrow tube through which *microscopic* photograms containing the dispatches, produced upon collodion, are to be transmitted. It appears that this method of operating was first used during the late siege of Paris, and has now been improved upon. The execution of these microscopic photograms can be conducted by day or at night by the aid of the electric light. The tube through which these light pellets are to be transmitted need only be an inch or so in diameter. The motion is imparted by compressed air.

617. Paper, in the Boston Fire.—The *Advertiser* gave the following information on this head:

"Curious results followed some of the experiments made upon charred papers and documents, and the examinations of books in safes which proved worthless in the great fire. It was found that what paper-makers call poor paper, paper considerably "clayed," stood the test best. Parchment paper, used for bonds and legal documents, shrivelled up exceedingly, and the print blistered so that it could be read when writing was illegible. So it was with the engraved work on notes. The gilding on the account-books burned and charred showed out as bright and as clear as when the books were new, which brings up the question if to introduce gilt-edged account-books would not be well, on the ground that the gilt would stay the passage of fire to the pages within. Books crammed into a safe so that it was difficult to get them ont, suffered considerably less than those that were set in loosely, and in some cases came out from safes in which everything else was worthless, so far preserved that the figures on their pages could be deciphered. With charred papers, which could not be made transparent by any light whatever used, it was found, after the employment of vitriol, oxalic acid, chalk, glycerine, and other things, that anything that moistened them to a certain stage—to which it was delicate work to get and not to pass—made the lines, words, and figures legible through a magnifying glass. It has been the almost universal experience that lead pencil marks show out all right where ink marks cannot be distinguished. The success of the use of photography has already been noted.

618. Molecular Phenomena of Iron.—M. Yore mentions an interesting fact concerning iron when under the influence of heat and strains. A strained iron wire was heated to redness by a current of voltaic electricity, and then, the current being discontinued, was allowed ts cool. It was observed that there arrived a moment in the process of cooling at which the wire suddenly elongated, and then gradually shortened, until it became perfectly cold, remaining, however, permanently elongated. No other metal beside iron is known to exhibit this peculiarity—and the phenomenon is supposed to be owing to a momentary molecular change. This change, it is thought, would probably happen in large masses of wrought iron, and would come into operation in various cases where these masses are subjected to the conjoint influence of heat and strains.—*Iron Age,*

619. Carbon for Decolorizing.—Schwartz records the results of a series of experiments made the view of ascertaining whether, by igniting bone ash with organic substances, such as glue, size, sugar, etc., a good decolorising charcoal is formed, and also whether the spent animal black can be revivified to its former strength by a similar process. It appears from the author's extensive researches that animal black may be entirely revivified in closed vessels by ignition with organic matter, which need not be nitrogenous.—*Sci. Am.*

620. Plant-Phosphorescence.—To Excerpt 571 in our issue of Dec. 16th, on this subject, we may add the following, quoted from "*Belgravia:*"

On the 18th of June, 1857, about 10 o'clock in the evening, M. Th. Fries, the well-known Swedisb botanist, while walking alone in the Botanic Garden at Upsal, remarked a group of poppies, (*papaver Orientale,*) in which three or four flowers emitted little flashes of light. Forewarned as he was by a knowledge that such things had been observed by others, he could not help believing that he was suffering from an optical illusion. However, the flashes continued showing themselves from time to time during three-quarters of an hour. M. Fries was thus forced to believe that what he saw was real. The next day, observing the same phenomenon to recur at about the same hour, he conducted to the place a person entirely ignorant that such a manifestation of light had ever been witnessed in the vegetable world; and without relating anything concerning it, he brought his companion before the group of poppies. The latter observer was soon in raptures of astonishment and admiration. Many other persons were then led to the same spot, some of whom immediately remarked that "the flowers were giving out flames."

321. Subaqueous Telegraphy.—In 1828 Sturm and Colladon made a series of experiments at Lake Geneva, Switzerland, to determine the rate of transmission of sound through water, while others were stationed in another boat at a distance and received the sonorous impressions through a long metallic tube, the lower end of which was closed by a membrane and immersed to a considerable depth in the water. In these experiments the bell weighed about 130 pounds, and the sound was heard at a distance of about 14,000 yards. During the recent siege of Paris the attempt was made to obtain telegraphic communication with the provinces by this device of transmission of sound through water, and the Minister of Public Works confided the necessary experiments to M. Lucas, who reports the following results:

The experiments were conducted as in the former instance, and made in the River Seine. Two bells were emp loyed, one of about eighty pounds and the othrr of seven hundred pounds weight. In the case of the first the sound was transmitted to a distance of about 1,800 yards. There was, therefore, no advantage gained by the increase in the size of the bell—In fact, there was a loss. The great diminution in the distance to which the sound was conveyed in his experiments is accredited by M. Lucas to want of depth in the waters of the Seine, as compared with those of Lake Geneva.—*Scribner's.*

622. Petroleum for Boots.—Dr. Van der Weyde tells us petroleum is decidedly very injurious to leather; it shrinks the leather, so that boots dressed with it become finally so small that you can no more wear them. Leather pump-valves cannot be used for petroleum pumps, as they become so shrivelled up as soon not to fit any more, and cause the pumps to leak. His advice is to dress boots with castor oil. If the manufacturers soaked only the pegs in petroleum, before putting them in, he thinks it might be beneficial.

623. Turbid Waters.—Experiments have been made in Australia with the view of finding means of clearing the muddy waters of reservoirs. The purest waters are, as a rule, those in which mud and organic matter remain longest in suspension. Water stood in a bottle in the laboratory for more than six months without depositing the clay held in suspension. The soluble matter was chiefly chloride and carbonate of soda, and was present in only small quantity. Another water stood for three months with like results. Both waters contained more clayey than organic matter, and were rendered clear by an addition of chloride of calcium. One part of this salt in 1,000 of wate

cleared it in less than an hour; one part in 2,500 of water, in 5 hours; one part in 5,000, in 6 hours; one part in 10,000, in twenty-four hours. When, however, the water contained more organic matter than inorganic or clayey matter in suspension, the calcium salt did not act so readily, but was aided by an addition of lime; as little as two grains of quicklime cleared a gallon of water in twelve hours. Three or four grains of alum or chloride of aluminum answered the same purpose; but there are many objections to the use of alumina salts.

624. Spongy Iron and Drinking Water.—Some time in 1871, Dr. Bischof, Jr., took out an English patent for removing organic matter from drinking water by using a filter of spongy iron prepared by heating hydrated oxide of iron with carbon. The iron sponge not only purifies the vilest sewage water from organic matter, but also precipitates any copper present. It has, however, been found to possess this disadvantage, that the water so purified contains so much iron that it soon turns brown, and the iron separates in a copious precipitate in the form of the hydrated oxide of iron. This threatens to limit the usefulness of the discovery.—*Sci. Am.*

625. Fountains of Health.—Invalid tourists who, rendered skeptical by rumors of the artificially composite character of American mineral springs, are in the habit of flocking to foreign founts, will be interested in learning that a distinguished German physician has been investigating the merits of some of the most noted spas with which his country abounds, and gives thereof a far from encouraging account. He hints that even, granting the remedial efficacy of Weilbach's sulphur water, the very limited natural supply of that beverage is out of proportion to the quantity consumed; he shows how at Schlangenbad the ingenious device of painting everything blue is employed to produce a reflected tint upon the water and to make the yellow skin of customers look white; he casts a scientific sneer at Kissingen which professes to provide the tonic effects of sea air by means of dropping salt and water upon heated faggots; and he more than insinuates that the same tank at Canstatt supplies the various taps which are respectively labelled "Carlsbad," "Wildbad," "Plombieres," etc. Really if our most cherished illusions are to be dispelled at this rate there is danger that the American valetudinarian will be reduced to the distressing alternative of either desisting from his habitual drenching altogether or mixing his own table salt with his Croton or Cochituate at home.—*Daily Paper.*

626. Value of Ammoniacal Liquor in England.—Mr. H. E. Jones, of the Ratcliff Gas Co. has furnished to a London contemporary the following interesting tabulation:

Receipts for Liquor of the Metropolitan Gas Companies.

	Coal used. Tons.	Receipts for Liquor.	Receipts for liquor per Ton of coal.
Chartered	307,090	£12,959	7·8d.
Commercial	86,641	3,468	8·6
Imperial	378,040	7,584	4·8
Independent	54,309	3,599	15.9
London	103,660	3,253	7·5
Phœnix	123,751	3·238	6·2
Ratcliff	18,966	1,365	17.2
South Metropolitan	68,780	1,582	15·9
Surrey Consumers.	45,186	709	3·7
Western	66,881	1,458	5.2
Average			9·3

627. Alcohol as an Illuminant.—Mr. F. Collingwood has published comparative experiments made in the west caisson of the New York bridge, with alcohol and candles, to test their relative illuminating power under a pressure of 31 lbs., and at a temperature of 80° F.

The lamp had a loose cotton wick ½ inch in diameter. The base of the flame was two inches above the surface of the alcohol; the candle, of stearine, was 1¼ inches in diameter.

There was consumed per hour—under pressure—6 cubic inches of alcohol and 8·9 ounces of stearine, and in the open air, 2 cubic inches of alcohol and 4·0 ozs. of stearine.

In the condensed atmosphere, the lamp burned with a clear, bright flame—not blue—without smoke, and gave three-quarters as much light as the candle, which smoked greatly.

Taking into account the waste of stearine by flaring and short pieces not burnt—with alcohol at $2 per gallon, and candles at 28 cents per pound—for an equal amount of light, that from alcohol costs about twice as much as that from stearine.

It is suggested that a mixture might be made of alcohol and some carbonizing fluid to burn without smoking in a condensed atmosphere, the proportions being varied to correspond with the change of pressure.

628. Sewage: Porosity of Soils.—Sewage irrigation experiments at Merthyr Tydvil have recently furnished a remarkable illustration of the way in which drainage may and does poison wells. We quote from the *Engineer:*

"A comparison of the quantities of sewage and of the effluent water prove that the latter was more than double the former, and a careful investigation further showed that the rainfall was not sufficient to account for the very large increase. Whence, then, did it come? Observations subsequently revealed that it was due to the river, and that a complete system of percolation existed in the soil between the river and the drains. To set the matter beyond a doubt trial holes were dug in a field in the vicinity of the filtering beds, and it was found that the same thing occurred. When the water rose and fell in the river there was a corresponding variation of the level of it in the holes. It is easy to imagine in what condition the water supply of the town must be if the inhabitants are in the habit of having recourse to wells. One can realize the statement so frequently made, that in such cases the people do not pump water, but sewage.

629. Gas Prospects in Great Britain.—The year which is just passing away will be memorable in the history of gas undertakings in general, and more especially so in the annals of the Metropolitan companies. Very early in the year the effects of the disturbance in the labor market became sensible in an enormous increase in the price of coal, which as time went on necessitated a very general advance in the price of gas. But it was not merely a rise in the price of coal that had to be encountered. There was at times, in some parts of the country, an actual "coal famine," and it was difficult to obtain sufficient to carry on the manufacture of gas. The history of the "coal ring," or what led to the extraordinary disturbance of the market—for it is difficult to believe that the strikes of the miners were the sole cause—has yet to be written, and whenever written will form a most interesting chapter in the records of industrial economics. But we may let that pass. What gas companies have now to face is a very considerable, and lasting, advance in the price of coal. Some fall from present rates will no doubt soon take place, but we fear that a permanent rise of from 20 to 25 per cent. on former prices must be calculated upon. This is a serious prospect to all parties. Up to this year the price of gas has been everywhere slowly decreasing, but the public must now reconcile themselves to an advance not unlikely to be increased in the future. Up to this year, the companies have been able to make good dividends; but they, we fear, will have to reconcile themselves to some diminution of profits.—*London Journal of Gas-Lighting, December.*

630. The American Well in Railroading.—The "American Well," as that peculiar method of obtaining water, so much in use by our armies, during the war, is called abroad, finds favor wherever it is used. It is merely a pointed tube furnished with apertures near the point, and being driven into the ground, it forms a small well, 4 or 6 inches in diameter, and reaching 12 to 20 feet into the earth. These wells have been used by the Atchison, Topeka & Santa Fe Railroad Company, for supplying the boarding trains and brick-layers with pure cold water. Providing himself with three drive wells, the superintendent placed one at the end of the track and the others along the line in advance, one mile apart. An experienced well-driver was obtained in Hutchinson, and he contracted to take up, and carry forward and drive again, two pumps per day, removing one after the morning supply was obtained at the boarding train and carrying it forward one mile beyond the furthest pump. After dinner, for which the train moves forward one mile to the next pump, this pump is carried forward again to the front; and thus the men are constantly and cheaply supplied with fresh water. Excepting a few miles of the line beyond Cow Creek, one hundred miles west of Hutchinson, where the road leaves the valley and cuts off a bend in the Arkansas, striking it at Fort Dodge again, the pumps can be driven all the way to the state line, a distance of 280 miles. This is certainly pushing mechanism in railway construction pretty near to perfection.—*Eng. and Mining Journal.*

631. Colors of Precipitates.—Dr. H. C. Bolton suggests the use of the magnesium light for observing the true color of precipitates at night, to obviate the apparent change of color by yellow light. The magnesium tape may be used.

Purifying Gas.

Letters Patent to Robert Hogarth Patterson, of Hammersmith, in the County of Middlesex, Gentleman, for the Invention of "Improvements in the Purification of Coal Gas."

Sealed 28th May, 1872, and dated 9th March, 1872.

[Continued from page 23.]

II. New Principle and Process of Employing Lime Purifiers.—At present the action of lime purifiers is greatly impaired owing to the carbonic acid in the gas which enters them, whereby the lime in those vessels is converted into carbonate of lime, which does not absorb sulphur in any form. Indeed (as the principle for employing lime purifiers now described has not hitherto been known or applied), in gas works where oxide of iron purifiers are used after the lime purifiers the contents of these last named vessels under the present mode of working them sometimes exist almost entirely in the form of carbonate of lime, the lime having become desulphuretted by the carbonic acid in the gas, and the sulphur compounds driven forward into the subsequent oxide of iron purifiers. Under this patent I propose to eliminate carbonic acid from the gas in such manner that in any required number of the said purifiers the lime shall be converted into and (so far as required) maintained in the form of sulphides of calcium. And in doing so I turn to account the superior affinity which carbonic acid has for lime, for soda, for potash, and for ammonia, compared with sulphuretted hydrogen:

(1.) One process of applying the above described principle is by passing the gas through the first lime purifier or purifiers of the series for such time that the carbonic acid, from its greater affinity for lime, shall have expelled sulphuretted hydrogen from the said purifier or purifiers, taking its place, and driving it (namely, the sulphuretted hydrogen) forward into the succeeding purifiers. By this means the carbonic acid can be wholly eliminated from the gas by the first purifier or purifiers, while sulphuretted hydrogen being driven forward converts the contents of the succeeding purifier or purifiers into sulphide of calcium, which is a highly efficient material for purifying the gas from sulphur in other forms than sulphuretted hydrogen. Thereupon these latter mentioned purifiers, now containing sulphides of calcium, may be used first in the series, and the gas passed through them

into subsequent purifiers containing fresh lime, whereby the contents of these subsequent purifiers, or of any one of them, can be converted in turn into sulphides of calcium. Or the first purifier or purifiers of the series may be constantly employed, chiefly for the purpose of eliminating the carbonic acid from the gas, while sulphur in all forms is eliminated from the gas in the succeeding purifiers.

In devising this process of working lime purifiers I have been the first to see the importance of and to have practically carried into effect the principle of excluding carbonic acid from lime purifiers, or from any required number of these vessels, as a means of obtaining steady and perfect results in the purification of gas from sulphur. And in applying this principle I have also been the first to turn to account and practically apply the greater affinity which carbonic acid has for lime, for soda, for potash, and for ammonia than sulphuretted hydrogen has.

The process of working lime purifiers on this principle must vary according to the number of those vessels employed, and also according to the relative proportions in which carbonic acid and sulphuretted hydrogen exist in the gas which enters the said purifiers. It is also to be observed that the displacement of SH_2 * from lime by CO_2 depends to a considerable extent upon the rapidity with which the gas (containing CO_2) is passed through the sulphuretted lime. For example, when CO_2 is brought slowly in contact with lime in the form of sulphide of calcium, nearly the whole of the SH_2 will be expelled from the lime in any purifier before CO_2 appears in the issuing gas, whereas if the CO_2 is brought more rapidly in contact with lime in the form of sulphide of calcium a larger portion of the SH_2 will remain unexpelled from the purifier when CO_2 first appears in the gas issuing from the said purifier.

Hitherto no means have been employed by which the condition of the lime in purifiers could be or has been ascertained save by testing the gas at the outlet of the said purifiers (or of some of them) for SH_2, a testing which of itself, and as hitherto employed, gives no indication whatever of the efficiency of the contents of the purifiers for absorbing sulphur in other forms than sulphuretted hydrogen, for when SH_2 appears in the issuing gas this only shows that the lime can no longer absorb the SH_2 and affords no indication as to whether the contents of the purifiers are in the state of carbonate of lime (which is wholly useless for gas purification of any kind) or in the state of sulphides of calcium.

In connection with the system described in this specification a series of simple testings may advantageously be employed, by which the condition of the lime in each purifier can be adequately ascertained. In the first place it is desirable that the gas should be tested for CO_2 and for SH_2 (by the eudiometer or otherwise) at the inlet of the first purifier, for by knowing the relative proportions of CO_2 and SH_2 in the entering gas (which proportions do not greatly vary in any given gas work) the condition of the lime in the first purifier, and approximately also in the subsequent purifiers, can be known in advance. For example, if the gas as it enters the purifiers contains (as it usually does) 3 volumes of CO_2 to 1 volume of SH_2, then the first or immediate effect is that three-fourths of the lime in the first purifier are converted into carbonate and one-fourth into sulphides of calcium.

It is likewise advantageous to make testings for CO_2 and for SH_2 at the outlets of the purifiers, by which means the condition of the lime in each of those vessels can be ascertained with sufficient accuracy for practical purposes, thereby enabling the engineer to know and regulate the condition of his lime purifiers in such manner as to obtain steady results as regards the purification of gas from sulphur, thereby obviating the well-known excessive and hitherto unaccountable variations in the action of lime purifiers. After the said testings for CO_2 and for SH_2 have been made for a short time, the engineer will be able to ascertain the right mode of working his lime purifiers upon this new principle with sufficient accuracy, by simply noting the quantity of gas passing through his purifiers.

As a means of detecting the presence of carbonic acid in the gas issuing from the purifiers (whereby the condition of the lime in each purifier can be ascertained), I propose to employ an apparatus like that to be now described; but the same object may be attained by simply bubbling a portion of the gas at intervals through fresh lime water in any other manner. And in order that the said apparatus may be fully understood I shall now proceed more particularly to describe the same.

At inlet of each purifier a short length of three-quarter inch pipe is tapped into the main, and furnished with a three-eighth or half-inch main cock. From this cock a half-inch pipe is laid up to a metal box about six inches square and four inches deep, which has two or more glass sides, and is at each testing to be half filled with freshly prepared and clear lime or baryta water, through which the gas is made to bubble. A second service conducts the gas from the box back again into the main at outlet of purifier. A small plug is screwed into the top of the box for the convenience of filling it, and another such plug is fitted into the bottom for emptying it. Whenever the liquid in the metal box assumes a milky hue, this shows that carbonic acid is contained in the gas issuing from the preceding purifier.

I may remark that lime which is to be used in gas purification ought not to be slaked until immediately before being placed in the purifiers, for slaked lime absorbs carbonic acid from the air, whereby its purifying action upon gas is impaired.

2.) Another process of applying this new principle in the employment of lime purifiers is to eliminate the carbonic acid from the gas by the soda washers or scrubbers to be next described, in which case the lime in all the purifiers can be converted into sulphides of calcium, and thereafter maintained in that form.

III. Soda Washers or Scrubbers.—In connection with the purification of gas from sulphur I also propose to make the gas pass through or otherwise come in contact with a solution of caustic soda, or of potash, or of ammonia. The solution may be used in one or more washers or scrubbers. I prefer to use soda for this purpose, and I shall describe the process in connection with soda, but the process is the same if potash or ammonia be used.

(1.) When employed in connection with the purifiers charged with sulphide of calcium, described in section I., or with the sulphide of sodium vessels to be afterwards (described vide section IV.), the soda washers or scrubbers should be used next before the said vessels; thereby the whole of the carbonic acid can be and ought to be eliminated from the gas before it enters the said vessels, the sulphuretted hydrogen as above mentioned having been previously eliminated either by oxide of iron or otherwise.

The fouled or carbonated liquor withdrawn from the soda washers or scrubbers may be converted back into caustic soda by treating it with fresh lime in the ordinary manner employed in alkali works (i. e., raise the liquor to the boiling point and thereafter allow the carbonated lime to settle), whereupon the liquor can be again employed in the said washers or scrubbers.

(2.) When employed in connection with the ordinary lime purifiers, these soda washers or scrubbers will be used between the ordinary washers or scrubbers (i. e., those employed for eliminating ammonia) and the lime purifiers. So placed these soda vessels will act alike as decarbonators and as a means of converting the lime in the purifiers into sulphide of calcium, as follows: The soda solution will absorb both the carbonic acid and the sulphuretted hydrogen contained in the gas at this stage of purification, and will at first take them up simultaneously, but as carbonic acid has a greater affinity for soda than sulphuretted hydrogen has, after the soda solution has become saturated with these two gas impurities, the carbonic acid will proceed to displace the sulphuretted hydrogen, the result being that the carbonic acid can be wholly arrested in the soda washers or scrubbers, while the sulphuretted hydrogen displaced by the carbonic acid will pass forward into the lime purifiers, converting their contents into sulphide of calcium. When it is desired to eliminate the whole of the carbonic acid from the gas before it enters the lime purifiers, the solution in the soda washers or scrubbers is to be withdrawn, and fresh (i. e., caustic) liquor supplied to the said washers or scrubbers as soon as the gas which issues from them shows traces of carbonic acid.

The fouled liquor withdrawn from the said washers or scrubbers may be treated with fresh lime, whereupon the liquor can be again used in the said washers or scrubbers.

Note.—Lime is a dirty material to use in gas works; moreover, however used, it is objectionable on account of the nuisance which it occasions to the neighborhood; accordingly it is desirable to reduce the quantity of lime used in gas works to the smallest amount necessary. As hitherto employed, lime has been used to purify gas from sulphur in all forms, namely, both from sulphuretted hydrogen and from the sulpho-carbons indiscriminately, and also with so little knowledge of the correct principles for using this material (now for the first time set forth in this patent) that it has been impossible to prevent great fluctuations in the action of lime purifiers upon the sulphur, especially in other forms than sulphuretted hydrogen.

My soda washers or scrubbers afford a means of confining the use of lime in gas works to the elimination of the sulphur in other forms than sulphuretted hydrogen, by employing the said material (lime) only in the form of sulphides of calcium. For example, suppose it is desired to use sulphide of calcium purifiers, as described in section I., then the soda washers or scrubbers may be employed first of all and temporarily to make or produce the sulphide of calcium to any required amount. This is done by using these washers or scrubbers immediately before a purifier or purifiers containing fresh lime, and passing the gas into the said washers or scrubbers before it has been purified from sulphuretted hydrogen. Then owing to the power of carbonic acid (contained in the entering gas) to displace sulphuretted hydrogen from the soda solution, the sulphuretted hydrogen can be driven forward from the said washers or scrubbers in any quantity (by changing the soda solution as soon as carbonic acid appears in the issuing gas), thereby converting the lime in the purifier or purifiers into sulphides of calcium. After the contents of the purifiers have thus been converted into sulphides of calcium, the gas is to be passed into the soda washer or scrubber, after it has been purified from sulphuretted hydrogen (say by oxide of iron), the said washers or scrubbers being then used simply as decarbonators, i. e., to eliminate the carbonic acid from the gas, thereby maintaining the sulphide of calcium in the purifiers in an efficient condition for purifying gas from sulphur in other forms than sulphuretted hydrogen.

(3) I also propose to employ washers or scrubbers containing a solution of caustic soda or potash as a direct means of purifying the gas from sulphur in other forms than sulphuretted hydrogen. In this case these washers or scrubbers are used after all the other purifying processes—whether by lime, by oxide of iron, or otherwise—and after the gas has been purified from sulphuretted hydrogen and from carbonic acid.

IV. [1.] I also propose to attain the same object—namely, the purification of gas from sulphur in other forms than sulphuretted hydrogen—by means of sulphur in a state of fine division used along with sawdust or such like substance as, together with the sulphur, will form a porous material through which the gas can pass freely. This material may be used in the ordinary purifiers in gas works.

[2.] I also propose to use sulphur mixed with soda or with lime, or with lime and soda together, in solution or otherwise; I prefer to use the sulphur with soda, and I will describe the process accordingly.

[To be concluded.]

* ... may not be unacceptable to some readers to note that by Sir M. Patterson methods purely and simply sulphuretted hydrogen. He follows a practice now fashionable with a prevailing school of English chemists.—Ed.

Coal as an Element of National Strength.

In the course of an address lately delivered before the Pardee Scientific Department of Lafayette College, by Mr. P. W. Shaefer, we find the following:

We magnify the importance of coal in our country; first, because of its value as a fuel; and second, because of the vast supply stored here. The first point no longer needs demonstration since that day in 1812, when the workmen at White & Hazard's nail works, at the falls of Schuylkill, left their furnaces in a rage because they could not make the "black stones" burn, and returned to find that during their absence they had nearly melted down the furnace doors, anthracite coal has stood without a rival upon earth. Practical as well as analytical tests have failed to find an acceptable substitute. Neither wood, nor peat, nor oil, nor any other substance contains pure carbon in so condensed and cheap a form, says Prof. Jevons; and Prof. Tyndall adds: "I see no prospect of any substitute being found for coal as a source of motive power. We have, it is true, our winds, and streams, and tides; and we have the beams of the sun. But these are common to all the world; we cannot make head against a nation which, in addition to these sources of power, possesses the power of coal."

Prof. Tyndall further says: "We should have, in my opinion, no choice whatever in a race with a nation which, in addition to abundant coal, has energy and intelligence approximately equal to our own"—a

significant admission from an authoritative source. England must soon yield to America in the great competition of the nations. The strength of both is in their coal mines, and in England these have already reached nearly or quite their maximum of production, while our anthracite is but partially developed, and our bituminous coals are scarcely touched. The great body of our present coal supply lies within 500 feet of the surface, while the depth to which English miners are obliged to go is best seen from a statement of their principal shafts:

The Houghton pit is 780 feet in depth.

The North Seaton pit is 744 feet in depth.

The Ryehope colliery is 1680 feet in depth, and the Dunkenfield was sunk to a depth of 2000 feet, at an expense of $500,000 in money and ten years of time, mainly to reach the "Black Mine coal," a bed of 4 feet 8½ inches thick. Compare this with the "Hickory Shaft," near Pottsville, the deepest working shaft in America. This shaft, which is 666 feet deep, cost $100,000, was sunk in 428 working days, and developed 76 feet of coal.

The English people are now discussing the probable depth to which they can follow their coal seams. Prof. Jevons "shrinks from endorsing the 4,000 feet theory," but stops short at 2,500, and says when they reach that depth a complete supply of coal will come in from Pennsylvania. We have superior advantages in working our anthracite coals, from the inclination of the beds and their consequent cropping out on the surface. We find solid coal within 20 to 50 feet of the soil, and sinking our slopes in the coal itself, at a cost of not more than $100 per yard, exhaust the first set of coal chambers, and then, sinking 100 yards deeper, make a new set, and so go on until we reach the bottom of the basin. This is far cheaper and more expeditious than the deep shafts which the English are obliged to sink vertically through hard rocks, intercepting all the water courses which lie between the strata, and thus adding a heavy expense for drainage to the dead loss of capital in removing unremunerative material. The great Monkwearmouth pit was only completed after 20 years' labor: our energetic Americans sink their slope, build a breaker, put up miners' houses, pumps, engines, etc., and in one year, are shipping coal.

A good idea of the extent of our anthracite resources may be gained from a single illustration. The Mahanoy Valley, in Schuylkill county, Pennsylvania, is about 20 miles in length by half a mile in width. In this area there are 25 collieries, and these will produce, on an average, 2,000,000 tons of coal annually, for the next 50 years. All this from a single synclinal trough containing about one-fortieth of our anthracite coal area.

But though Pennsylvania's store of anthracite will last for many years, and long after it is drawn upon to supply England, it is useless to deny that there is a limit to the supply, and that, after a time, it will be exhausted. Then what shall we do?

We shall proceed to open the grand reservoir, the bituminous coal-fields, compared to which our anthracite beds are but as a mill-pond to the Gulf of Mexico. With a bituminous area of 12,000 square miles in Pennsylvania, and 197,000 in the United States, we can supply the world with fuel for ages to come.

And after the bituminous, what? Brown coal—lignite—that queer, woody-looking mineral, little known as yet, but already beginning to be used, and destined to play an important part in the world's great drama, ages hence. With this, as with the other coals, America is still the favored land. It is found from Behring's Straits to Salt Lake City, and again in Tehuantepec, Panama, Peru, and from Chili to Patagonia. But it also occurs in many other parts of the earth. It stretches in almost a continuous belt across half the world, from France to China. It is found in Australia, Van Dieman's Land, Sumatra, Borneo, and probably in many other countries where the bowels of the earth have not yet been explored.

So we shall not lack for fuel *very* soon. The main point, however, is that Pennsylvania holds the key to these vast store-houses of fuel, and consequently to the workshops of the world. Her supreme command of the world's supply of anthracite, and her rich deposits of iron give her a prestige which she will never lose.

Widely distributed though the coals and metals are, a glance at a map of the world on which their areas are defined, will show how insignificant is the space they occupy, when compared with those parts of the earth from which they are absent. It has always been the case that the nations best supplied with these treasures, and which knew best how to use them, have held the commercial supremacy of the world. Where these truly "internal resources" go, wealth and influence are sure to follow. The distribution of fuels is almost entirely, and that of metals to a great extent, in the northern hemisphere; and the northern hemisphere is the field in which all the arts and sciences are cultivated. In the United States, a belt four degrees in width, say 258 miles wide and 2,600 long, containing 676,800 square miles, say but one-fifth of our total area, having for its medial line the fortieth degree of north latitude, and running from the Atlantic to the Pacific, embraces the most of the great coal and ore beds; and it is precisely within this belt that the main railroads and canals, the Pacific road from Omaha to the Sierra Nevada, the great centers of industry, the principal commercial and manufacturing cities, are to be found. New York, Philadelphia, Pittsburgh, Columbus, Indianapolis, Springfield (Illinois), Denver and Salt Lake City are all nearly in the middle of the belt; while Boston, Chicago and San Francisco are just outside of it. The fortieth degree of north latitude may, indeed, be called the backbone of the United States, and Pennsylvania, holding a central position on this belt, with one hand on the inter-ocean highway of the nations and the other on the magnificent river system of the Mississippi Valley, having her lap filled with the country's choicest mineral wealth, well merits the proud title of the Keystone State, for she both *binds* and *crowns* the Union.

[To be concluded.]

Gas in Theatres.

Mr. E. L. Blanchard writes in the *Birmingham Daily Gazette*:

"Gas was first introduced into Covent Garden, Drury Lane, the Lyceum, and Astley's Amphitheatre, in 1817–18. Coal gas was originally used, but in 1820 the proprietors of Covent Garden adopted oil gas, which they manufactured on the premises. The audience portion of the Haymarket Theatre was lit up with wax candles as late as 1843, Mr. Benjamin Webster paying an extra $500 per annum in that year to the proprietor, Mr. David Morris, for the privilege of introducing gas. As a curious illustration of the strength of prejudice, it may be worth calling to mind a circumstance little known, that the inhabitants of Grosvenor Square pertinaciously clung to the old oil lamp, and resisted the introduction of gas till 1842. The Covent Garden playbill for the opening night of the season, September 8, 1817, has the following announcement:

"The proprietors respectfully inform the public that an entirely new method of lighting the theatre has been adopted, effected by a magnificent chandelier, which from the centre of the ceiling diffuses a soft and brilliant light around without obstructing the view of a single spectator. In its effect the body of light is equal to 300 Argand lamps, and the heat is directly carried off through a tube communicating with the open air.

"In a few days afterwards the proprietors announced that 'the new method of lighting and ventilation has succeeded even beyond their most sanguine expectations.' Nevertheless, there were great risks run in the early times of theatrical illumination. By a somewhat odd coincidence, November seems to be a month when our arrangements for the supply of carbureted hydrogen appear to be peculiarly liable to get out of order. On the 16th of November, 1828, the Covent Garden Theatre was closed for one week, the following address, signed by Mr. J. Fawcett, stage manager, being issued in explanation to the public:

"'When the brilliancy of gas illumination attracted general admiration, the proprietors of this theatre, anxious to adopt every improvement which would give brilliancy to the scenery and the appearance of the theatre, introduced it, and, to prevent the accidents which the best street illumination is liable to, they, at a great expense, constructed gasometers. Finding, however, that with the utmost care and skill the introduction of gas in the audience part of the theatre produced an offensive odor, and the public having suffered inconvenience and disappointment in their amusements by the mischievous agency of some malignant and interested persons, the proprietors have determined to remove the gas, not only from the box circles, but from all avenues leading to them, as well as to the pit and galleries. But as this important alteration cannot be effectually done while the theatre is nightly open, the managers have determined to submit to the heavy loss of closing their theatre rather than allow the public to suffer any drawback to their theatrical enjoyments.'

"Two days afterwards occurred the explosion of the gasometers. The place where the gas was manufactured was under the Covent Garden Piazza, and communicated with the theatre by a long vaulted passage. Fortunately the solidity of the arches on which the theatre was built prevented any serious damage to the building, but the explosion destroyed the lives of three persons connected with the establishment, one of them being the uncle of Mr. John Douglass, now lessee of the Standard Theatre. The company played in the meantime at the English Opera House, and the theatre was not opened until December 3, when, with wax candles employed all over the house, Kean played Shylock. A manifesto was issued from Drury Lane the same day to assure the public that no gasometer was to be found on the premises, but that all parts of the theatre lighted with gas were supplied from the main of the Chartered Gas Company. The King's Theatre, the Adelphi, and English Opera were all furnished from the mains of the same company.—*London Gas-Light Journal.*

Apparatus for Heating by Gas.

The *Bulletin de la Societe d'Encouragement* gives the following description of an improvement to Perrot's apparatus for heating by gas, which, although of small size, is capable of fusing from 400 to 500 grammes of alloy in half an hour, with a very small consumption of gas.

The heating apparatus proper consists of six burners of bronze, fixed on a box to which is led the air and gas which are to be mixed. This box is divided horizontally into two compartments; the lowest of these chambers is annular, and receives the gas which passes into the burner through little conical nozzles, whilst the air enters the upper compartment direct, and thence to the burners. The gas is regulated by means of a tap on the supply pipe, on which is mounted a small gauge. The air passes into the box, through a valve formed of a disc pierced with three openings corresponding to three holes of the same diameter formed in the bottom of the box. A lever connected with the valve serves as a regulator for the supply of air. The burners are bent round at the ends, in order to give a curved direction to the flame, and to mingle the gas more intimately with the air coming from the outside of the burners. The flame heats a crucible carried upon a cylinder of fire-clay, and a small cast iron chamber is placed beneath to receive the melted metal in case of an accident happening to the crucible. After the crucible has been heated, the gases circulate around the outside of an envelope surrounding it, and then pass into an ordinary chimney, or through a stove-pipe uptake. The simplicity in the means of regulating the air and gas, the helicoidal movement given to the flames, and the arrangement employed for receiving the cast metal in case of accident, are the chief modifications introduced by Mr. Wiesnegg, the inventor of the improved furnace.—*Iron Age.*

Meeting of the Coal Producers.

WAR DECLARED AGAINST MIDDLEMEN—PRICES TO BE RAISED.

A meeting of gentlemen representing the coal trade was held yesterday afternoon (Jan. 16) in the office of the Delaware and Lackawanna Coal Company, No. 26 Exchange place. The meeting was brought about by the exertions of Mr. Franklin B. Gowen, President of the Reading Railroad, who arrived in the city yesterday. Every company in the city was represented.

Mr. Gowen stated his views to the meeting at considerable length. He was opposed to the countenancing of the operations of middlemen, who were instrumental in bringing about the disastrous results to the trade. These men in many cases had had coal assigned to them without investing a single penny in it, and rendered as the only service for the consignment their labor in securing buyers. With a large consignment of coal in their possession these men were enabled to charge their own price therefor, and return to the producers an amount that in many instances did not cover the cost of production. When competition became great among the consignees, they would not hesitate to sell at any low figure, as in the event of their doing so they would have nothing whatever to lose, while their ambition to defeat their competitors cost the producers dearly. Coal had been selling for the past year for a fraction above $4, an average of 70 cents of which amount was being thrown into the coffers of these middlemen. He proposed. therefore, that this amount be credited hereafter to the coal companies, and that the price of coal be raised to $5 per ton on an average of all kinds of the mineral. This advance would be by means oxressive to the consumer, while as a matter of justice purè and simple the producer would thereby be reimbursed for his losses during the last year. These losses have been so great that the producers have assumed the positions of caterers to the public free of charge, and by the increase that they now desire to have established they will only be repossessing their own money. The Reading Railroad Company was ready to assist the trade as far as was possible in preventing the operations of these intermeddlers. The company proposed to prevent, with the aid of the producers, the shipment of coal to parties who do not buy and pay for it. Mr. E. A Quintard, who represents the Pennsylvania coal dealers and producers of that State generally, added his weight to the proposition of Mr. Gowen, and it was then agreed by those present to combine against the middlemen and in no case to sell coal to those who buy 1,000 tons at a cheaper rate per ton than to the man who can afford to buy but one ton. A future meeting will be held, at which the price of coal for the ensuing year will be decided.

THE COAL COMBINATION.

[We take the following from the *N. Y. Herald* of the 28th ult.]

Unusual excitement prevailed among the city coal dealers yesterday, in consequence of all manner of reports concerning the alleged combination of several large companies for the purpose of controlling the market. Letters have been received from the officials of the Reading Railroad, offering all the usual facilities of transportation to mine owners, and averring that no coercion need be feared. Rumors are afloat, however, that obstacles will be interposed by independent speculators. In Philadelphia the people are vigorously opposing the scheme, and threaten to bring the matter before the courts, and the position of the Reading company will probably form an issue at the next election. The agents of the suspected companies stoutly deny the charges brought against them.

The coal companies of this city, which agreed to meet together at the end of each month and fix the price for coal for the succeeding month, have just established the rates for February.

The following is the scale just adopted by the Delaware and Hudson Canal Company, as compared with the prices at the beginning of the year:

	Jan. 1.	Feb. 1.
Furnace—lump	$4 30	$4 60
Steamer—lump	4 40	4 70
Grate	4 50	4 70
Egg	4 75	5 15
Stove	5 20	5 50
Chetsnut	4 30	4 60

The above prices are for coal deliverable on board vessels at Weehawken, and show a general increase of thirty cents a ton.

Gas-Light Fog.

New York as a city is a great one, but it becomes a city of "magnificent distances" at least in a gas-light fog, such as we had on Saturday night, Jan. 25th. Time was out of joint with the car lines and omnibusses, and figures looked shadowy under the uncertain glimmer of patent reflecting gas lights, which would not shine, and when a fringe of icicles made curious looking long lines with the flame of light behind them. Being bound down town in one of the stages which took the length of Broadway in its route was a journalistic luxury—it was a chance to imagine sensations in the way of more than a daily murder, and yet less than an actual conflagration. The long line of gas-lights spread out the great thoroughfare as a view in a panorama, and the buildings looked like old-time pictures with a new dress, nodding at the pedestrians and drivers, while the brilliant magnesium lights used at several of the theatres—casting their pure rays upon the vehicles—seemed like the presence of a series of fires, and made things look ghostly when a few feet beyond their line of illumination, The snow beneath, the haze above, and Broadway in a state of local demoralization without the aid of the Italian laborers to clean it, or their presence to give an operatic effect, was curious and pretty if not dangerous.—*World.*

The Catskill Gas Works.

The Catskill Gas Company was organized in 1858, with the following officers: G. T. Sutton, President; T. W. Sutton, Managing Agent. Workmen—Peter Magee, stoker; P. Cary and John Magee, assistants. The first gas was furnished September 1, 1858, on the occasion of the illumination over the successful laying of the first Atlantic Cable. In February, 1861, the storehouse, shop, tanks, etc., were partially destroyed by fire. The works were immediately rebuilt, and have since been enlarged to meet the increased demand.

The works has three benches of retorts, two in each—or six ☐ retorts, of an average length of nine feet, width of two feet, and height of one and a quarter feet. There are two gasometers, one 20 feet in diameter and 12 feet high; the other 25 feet diameter by 14 feet high, thus giving an aggregate of about 10,500 cubic feet. On rare occasions, when the village is "up late," or there is something unusual going on, this supply has been exhausted in one night, and can be accumulated in a single day.

Pennsylvania bituminous coal is used, about three tons a day in winter and two tons a day in summer. Six thousand feet of gas per ton is the average product. There are about three miles of street mains, exclusive of service pipes in buildings.—*Catskill Recorder.*

BLEW OUT THE GAS.—The fellows who continue to blow out the gas when going to bed, have not all been killed yet. One of them went to bed in a hotel in Auburn last week. He calmly blew out the light, and retired to bed. Some one in the neighborhood discovered that the gas was leaking, and bursting the door of the fool's room open, saved him from suffocation. In the morning he remarked to the clerk:

"The gas must have leaked considerably last night." The clerk answered it had leaked a good deal. "Ah," said gawky, "I thought so. Did it run over and spoil the carpet anywhere." And it is for such people as this man that public schools are supported. Newspapers are of no use to them, as they look on them as new-fangled follies.

Water for Long Island City.

Long Island City has suffered, particularly in the southern wards, from a lack of water, and an accurate survey, establishing its street and pier lines and grade. The last of these needs will be supplied at an early day through the efforts of a legislative commission, and the first mentioned want is also likely soon to be satisfied. After waiting some time for the Common Council to authorize the issue of bonds for the work, the Mayor announced his intention of proceeding with the undertaking, as he was satisfied the statute authorized such action. In this the Water Board and public sentiment generally concurred.

Several systems of water supply were examined and inquiries made where they were in operation. Sources of water in and near the city were visited and their capacity tested, and engineers were consulted respecting the cost and feasibility of the different plans proposed. The Common Council have at last authorized the issue of bonds, and the Water Board on Tuesday evening executed a contract with the Holly Manufacturing Company for a set of its No. 4 machine at a cost of $55,000, and one hundred double fire hydrants at $50 each. The location of the works will next be decided, and their building will be begun as soon after as practicable.—*Brooklyn Times, Jan.* 30.

The Waste of City Water.

The following statement is caused to be sent to the HERALD by the Commissioner of Public Works in relution to the supply of water:

For some time past there has been more Croton water delivered in the reservoirs in this city, and distributed by mains throughout the city, than at any former time. But owing to the immense quantity of water that is suffered by the consumers to run to waste, the head of water in the higher parts of the city has been inconveniently low.

The Commissioner of Public Works is using every exertion in his power to stop this waste, and if the citizens generally will at once put a stop to all waste on their premises, they will immediately restore the head to its usual height, and have all the benefits and conveniences of water at a high level. The weather has now so far moderated that the practice of letting the water run continually to prevent it from freezing and bursting the pipes should cease, and the Commissioner has determined to apply such remedy as shall be adequate to prevent it in future.—*N. Y. Herald.*

The Water Supply.

The work of laying the pipes to supply Washington Heights with Croton water from the lately constructed tower at High Bridge, is being rapidly pushed forward. Mr. Roche, who is superintending the work. estimates that the pipes will all be laid in about three months, after which water can be obtained at the tops of houses on the greatest prominences in the upper end of the island, without the aid of pumps. Water is to be raised in the tower, which is equally as high as any house in Fort Washington, from reservoirs built for its accommodation, and will find its own leve through the pipes now being laid, to the tops of the houses on the Heights.—*N. Y. Herald, Jan.* 28.

A New Gas Company for Brooklyn and Kings County.

A bill to organize the Equity Gas Company of King's County was introduced in the Legislature on Friday, 31st ulto., by Mr. Worth. The incorporators are Benjamin F. Tracy, Francis L. Dalton, Stephen J. Colahan, Noah L. Cocheu, William C. Wren, Bernard Peters, George Wren, John Pybourne, Anthony Barrait, Thomas Ennis, Andrew Walsh, John M. Clancy, John T. Venus, George C Bennett, Adolph Baker, Benjamin W. Wilson, Frank Smith. Henry Summersgill H. C. Boswell, Joseph Creamer, John Flaherty, Lewis R Segman, William Reed, Lawrence Whitehill, John G Jurgens and Felix Campbell.

The company proposes to furnish gas of eighteen candle power or over, for three dollars per thousand feet, and asks franchise to lay pipes in Brooklyn and the country towns.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Arsenic Again.

Knoxville, Tenn., Jan. 22, 1873.

Mr. Editor: The communication in your last issue, signed "Citizen," is, I think, calculated to convey a very erroneous impression to the minds of some of your readers. I refer to that portion of it relating to the presence of arsenic in coal and coal gas. Doctor Franklin states in his "Chemistry of Gas Lighting," page 5, "that coal, wherever found, whether in Europe, Asia, America, or Australia, has invariably the same surrounding stratification and position; the same kind of shells, calamites, and other vegetable remains; the same general characters; and, as will be seen, the same description of impurities. Indeed, connected with this latter circumstance is a fact upon which sufficient stress has not been laid by writers on geology. *Coal never contains arsenic*, nor is the pyritic iron of the coal formation contaminated with this poisonous substance, though, as is well known, ordinary iron pyrites or mundic from the chalk and sand formations constantly yields oxide of arsenic when burnt, as it frequently is for the production of sulphuric acid. But for this singularly provident arrangement, coal could not have been used, either as a fuel or for the purposes of illumination, without infinite danger to human life." And as for the products which arise during the combustion of gas, I will again quote from the same book, as it will be interesting to a large number of your readers. "By way of illustrating the nature of the process which ensues during the combustion of coal gas in atmospheric air, we may assume the following diagram as sufficiently near actual composition of the agents employed, and the results obtained:

Air.	Nitrogen	Nitrogen.	
	Oxygen	Water,	
Gas.	Hydrogen		
	Carbon	Carbonic Acid, with the air.	
	Carbonic Oxide		
	Sulphur	Sulphurous acid and Sulphite of Ammonia, with the air.	
	Ammonia		
	Carbonic Acid	Carbonic Acid.	

I can assure "Citizen" he need be under no apprehension from the presence of bisulphuret of carbon in the gas, as it is now manufactured and sold. It is quite against the interest of the gas engineer to allow it in the gas. The present mode of short charges which is now almost universal, has the tendency to almost entirely exclude bisulphuret of carbon from the gas. I quite agree with "Citizen" that all gas stoves for cooking or heating should be constructed with a flue to carry off the products of combustion. It matters not what is the heating or illuminating agent employed, the products of such combustion should, in all cases, be carried out of the apartment.

I believe it is a well known fact, that the match used to light the gas with, evolves in its combustion a larger amount of deleterious gases than two gas lights will do, burning three hours. Respectfully,

James Somerville.

Cooking by Gas.

New York, January 30, 1873.

Mr. Editor: Having paid some little attention to the subject I will, with your permission, say a few words relative to the importance and economy of the above. I notice Mr. Hartley at the British Association of Gas Managers, gave a very learned dissertation as to the best form of burner and stove. I wonder who told him what he knows about cooking. According to him you need only take Mr. Magnus Ohren's trivet and place it over an ordinary gas bracket, and then the whole thing is complete—it sounds to me in this connection When Mr. Magnus Ohren recommends "Citizen" to buy one of Wright's gas stoves. he and Hartley know how it is themselves, as Hartley runs the establishment of the late Alexander Wright, whose name it bears.

These two gentlemen speak of cooking and heating by gas in England as if it was something to be introduced, when really it is more general and common (where gas is cheap) than any other known methods; one of the drawbacks there, as here, is the cheap trash put upon the market as gas stoves, and sold by retail at 1s. 6d. each. People buy them because they are cheap, use them two or three times, when they become useless and are thrown away in disgust.

"Citizen" again is afraid if we cook or warm ourselves by the use of gas, we run a great risk of being poisoned with arsenic. This is nothing more than a high flown scientific fallacy. Admitting that nothing can be annihilated, I question whether you could catch as much poison after cooking your dinner as would be necessary to digest it. The quotations he gives from Dr. Letheby about the binding falling from books, etc., was most of it manufactured for the occasion, and was merely made for the purpose, during a bitter fight between the gas companies and the Corporation for the city of London. Its effect was to show that the companies made impure gas, the Doctor going it strong on behalf of his employers. At the same time, a learned shoemaker and alderman of the city gave evidence before the same committee that the shoes he made would not wear, and let in the water, because the gas was so bad it spoiled his wax. It requires no stretch of the imagination to determine the value of ventilation. No room, whether used for cooking or other purpose, should be without a free current of air. The argument against using gas stoves, because arsenic may have been found in gas, is very poor. You might with equal justice say don't smok a cigar because there is nicotine in tobacco, or, don't eat bread, because (if you are a temperance man) it contains the components of brandy, or, if you want to quarrel with your wife, tell her her moire antique is colored with gas tar, and her jockey scent is the essence of cow dung.

What we have to consider is, to get the greatest amount of good for the smallest amount of evil, and as gas has been extensively used for twenty years for cooking and heating purposes, without anybody being poisoned. I think there is not much to fear in that direction. I have used it regularly for four consecutive years to cook for my family, and was never poisoned. The great point with stoves is to get a proper atmospheric burner, which is not difficult; you can then boil, stew, or fry, at a quarter of the cost of an ordinary coal fire. Last summer I took the trouble to investigate the cost with a burner I make, nothing being special but the burner, with the following result: I took an ordinary iron pot used for the coal stove, put a gallon of water into it, placed it on top of the burner (without any trivet), and in thirty minutes it boiled with two feet of gas by the meter. I next placed seven pounds of ham in the water, and it was thoroughly cooked in one hour, with six feet of gas consumed from commencement, at a cost of about one and a half cents. Respectfully yours,

John Keeling.

Another Pioneer Gone.

Mr. Reuben D. Baldwin, who for 25 years was Superintendent of the Newark Gas-Light Company, died January 14th, aged 67 years.

Mr. Baldwin was known throughout the county by every one of any prominence, engaged in the gas business, as a most intelligent, careful, economical and successful gas manufacturer. He was one of the first in this country to appreciate and introduce clay retorts and the exhauster, and the working results obtained under his management would be considered extraordinary, even to-day, by many who think they are doing very well. He was an intelligent and influential man outside of gas matters, and was one of the originators of the Newark Lime and Cement Company, the Newark and Rosendale Cement Company, the Newark Ice Company, and other corporations whose success has been remarkable. He was always regarded as an honest, wise, and prudent counsellor and had the unbounded respect of the community in which he lived.

Mr. Baldwin was considered a remarkable man by many of those who knew him intimately, and his death will prove a serious

The Metropolitan Gas-Light Co.

A number of boarders at the Broadway Hotel, Forty-second street and Broadway, have called the attention of the Board of Health to the fact that the Metropolitan Gas Company on the lower part of the premises in question store old gas meters, and that such practice fills the hotel with gas and noisome odors detrimental to health. The company's officers were notified to remove the nuisance, and discontinue the storage of the same in the building. To this notice Mr. Oscar Zollikoffer, the President of the company, applied for a hearing in respect to the order granted, and the request was referred to the Sanitary Committee.

Sectional Shut-Offs.

The Board of Assistant Aldermen met on the 17th ulto. The minutes of the last meeting were read and approved. Resolutions from the Aldermen, by districts, were then in order. A communication was read from the Commissioner of Public Works in reply to a resolution passed on the 13th ult., requesting a "report on the propriety of requiring the gas companies to have sectional shut-offs, the same as the Croton Water Department." The communication stated that if the request was made with a view to prevent the spread of conflagrations, the Fire Department was the one to be referred to. A communication from Augustin Daly, requesting permission to remove the lamps formerly in front of his theater on on Twenty-fourth street to the same position at his new theater on Broadway, was referred to the Gas Committee. The Board then adjourned.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

February 3, 1873.

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$13 50	@	—
Kirkless Hall	13 00	@	13 50
English Caking Coals.			
Newcastle Gas	$7 50	@	8 00
Liverpool caking	7 25	@	7 50
British Province Coals.			
International—At Mines, $2 00 in currency	—		—
Block House—At Mines, $1 50, Gold		@	6 25
Little Glace Bay—At Mines, 1 60 Gold	—		—
Pennsylvania Coals.			
Penn Gas Coal—At Amboy	$6 75	@	0 00
Westmoreland	6 75	@	0 10
Shafton	6 00	@	0 00
Youghiogheny—At Baltimore	5 50	@	0 00
West Virginia Coals.			
Murphy Run	$6 75	@	0 00
Despard	6 75	@	0 00
West Fairmont	6 87½	@	7 00
American Gas Coal	6 62½	@	6 75
Fairmont	6 75	@	0 00
Newburgh Orrel	6 75	@	0 00
Pinnickinick	6 75	@	0 00
Cloverhill of Virginia	5 25	@	5 50
McKenzie Compound Mixture			8 00
American Cannel Coals.			
Peytona of West Virginia	$14 00	@	14 50
Darlington of Pennsylvania			— —
American Cannel	$10 00	@	10 00
Asphalts.			
Albertite of New Brunswick	$18 00	@	18 00
Ritchie Mineral of West Virginia	17 10	@	00 00
Trinidad Bitumen	— —	@	14 05

RECENT AMERICAN PATENTS.

Pertaining to the Specialties of this Journal, to date ending January 28, 1862.

132,793.—Gas Heater.—E. Barnes.

132,800.—Apparatus for vaporizing hydrocarbon liquids.—W. H. Burr.

132,839.—Apparatus for burning hydrocarbons.—I. Kendrick.

5,133.—System of water supply for cities.—B. Holly (re-issue).

13,0[illegible].—Machine for tapping gas fittings.—R. T. Crane

[illegible]2,939.—Dip or water tap for gas pipes.—J. H Vansteenburg.

5,103.—Manufacture of gas.—A. N. Wilkinson (re-issue).

[illegible]8,891.—Manufacturing gas.—J. C. Tiffany.

[illegible]3,3[illegible]6.—Water gage.—J H. Connell.

[illegible]3,437.—Water meter.—Gray and Brittingham.

[illegible]3,957.—Carburetter.—J. B. Terry.

[illegible]4,108.—Manufacture of illuminating gas.—T. G. Springer.

[illegible]4,109.—Manufacture of illuminating gas from oil vapor, hydrogen and air.—T. G. Springer.

[illegible]4,056.—Charging gas retorts.—A. P. Havens.

[illegible]4, 40.—Carburetor.—J. D. Averill.

[illegible]4,806.—Water meter.—W. Parks.

[illegible]4,299.—Apparatus for filling gas retort chargers.—T. F. Rowland.

THE AMERICAN

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AND

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☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

THURSDAY, JANUARY 16, 1873.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make [illegible] of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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THE PATTERSON PURIFICATION PATENT.

It will have been observed that we are now giving our readers the whole of this rather voluminous document, regarding it as matter quite sufficiently instructive and important to occupy the needed space. In the next issue, it will be concluded; when we shall probably refer again to the subject. It appears a fair inference, from the fact of the issuing to Mr. Patterson alone, of a patent covering substantially the whole of the results of the investigations of the late Board of Referees on the "sulphur question," that this gentleman must have been the *Deus ex machina* in this business. At this distance, however, and with our extremely general information on these matters, this conclusion may be of little worth.

Last May, in announcing the appearance of the last Referees Report on Purification, the writer took the liberty to refer to what he believes to have been his own share in the development of the use of sulphide of calcium for abstracting bisulphide of carbon, which forms the subject of Mr. Patterson's patent. The writer there showed (this Journal, May 2, 1872, p. 142, foot-note) that in a report to the Manhattan Gas-Light Co. in 1868, the reactions and the theory of them, were fully explained, and supported by reference to ancient and forgotten investigations of Berzelius, who never thought of applying them in gas purification. This report was at the time published in full in the London *Journal of Gas-Lighting*; and the writer has not been free from the feeling that scant justice has been done to himself, in the various discussions on this subject, by the total lack of reference to this substantial share of his own in the history of its development.

One more remark on this topic. Dr. Odling, in a lecture delivered last summer, went quite extensively into this subject, claiming to have developed the invention himself, independently of the referees, and ascribing the reactions that lead to the absorption of the bisulphide of carbon, to the formation of xanthic acid and xanthates, and so forth. Dr. Odling, we believe, omits to refer to the investigations of Stenhouse, published somewhere about 1860, on this subject. The writer has recently discovered, to his surprise, that Stenhouse went so far as to take out a patent for separating bisulphide of carbon from coal gas—July 19, 1860, No. 1752 of that year. Stenhouse used alcohol, wood-spirit or fusel-oil, with or without hydrate of potash or soda or ammonia, or sulphurets or carbonates of the same, and ascribes the action, as does Odling, to the formation of xanthic, or xanthomethylic or xanthamylic acid. More of this subject again.

ST. JOHN AND CARTWRIGHT'S PURIFICATION.

Two issues since we quoted from the *American Chemist* an item regarding the American method of Iron Purification of St. John and Cartwright, which we here reiterate as a text for a word or two of practical exhortation to our brethren of the fraternity.

"The St. John and Cartwright process for purifying gas consists in passing the gas through a mixture of the native hydrated oxide of iron, iron borings and charcoal, in place of the slaked lime. The cost of this material for purifying 600,000,000 feet of gas is $6,000, whereas the lime for the same quantity would cost $18,000. Moreover the labor saved by the iron process is fully 25 per cent. The process is already in use in several works, purifying an aggregate of 1,100,000,000 feet of gas per year."

Years ago the St. John and Cartwright invention was submitted to investigation by the writer, he himself being at the time somewhat of a sceptic regarding all iron-purification, as against lime-purification. This investigation, however, convinced him that these gentlemen had perfected an invention which is of the highest value, in economic and other respects, and this Journal took repeated occasion to urge on the fraternity the adoption of the invention. The facts, as ascertained, were precisely and undeniably as stated in the extract above.

It is rather humilitating, and must be discouraging to all concerned, to find that this remarkable process makes but slow headway, considering its remarkable merits. It certainly goes far to justify the reproach brought against the American fraternity of a general inertness and supineness regarding matters of progress in their art.

Let this matter be mended. The writer is sure that other gas companies, large and small, will find, on testing fairly St. John and Cartwright's preparation, and using it strictly according to their instructions, that they will save time, labor, house-room, and very soon, money, to an extent which will render it as indispensable to them as it is to the great New York Gas-Light Co. These inventors have thus far worked hard to put before the American gas world an invention perfected by years of practical experience on a large scale, and, so far from realizing any profit, are largely out of pocket. They themselves are experienced members of our fraternity, and therefore entitled to special consideration. Their advertisement, giving terms, etc., will be found as usual on page 6 of our advertising sheets.

THE NEWEST GAS MIRACLE.

We regret to find in the columns of our respected contemporary, the *Manufacturer and Builder*, the following item, the fallacy, not to say absurdity, of which, it is incumbent on us, *ex officio*, to expose:

"A new house-gas has been tested in London, and the experiment is said to have been successful. It is generated from gasogen, a liquid procured from distillation from mineral oils and mixed with a portion of dissolved resin, or other hydrocarbons. It has been calculated that a gallon, which will be sufficient to manufacture more than 1,000 feet of gas, may be bought for two shillings, and this quantity of gas will, it is stated, burn as long as 2,000 feet of ordinary coal gas. The cost, therefore, would be very small, and the apparatus being very simple, consumers may, if they please, make their own gas."

This may be the same thing mysteriously alluded to in a late issue of the London *Journal of Gas-Lighting*, which says:

"Rumors of some invention, which is to throw patent gas, air gas, and every other gas into the shade, have been current in some circles in the City for months past, and now it seems it is about to burst upon the world with shares issued at 20 per cent. premium!"

The above item quoted from Dr. Van der Weyde's valuable Journal, would furnish us occasion for some sharp words, were it not that we are sure that the Editor has not in this case exercised the chemical and mathematical acumen for which he is famous, and that such a statement as this could only gain admittance to his columns by inadvertence. We not only claim credit with him for forbearing anything that might be deemed ridicule or sarcasm, but shall fully expect him to be the first to acknowledge the *reductio ad absurdum* which a little simple arithmetic applied to the above figures will bring out.

The "gasogen," or naphtha he speaks of, is not

likely to have a specific gravity of more than 800°, water being 1000, and, as resin has about the density of water, the mixture could not have a density of more than 850°, and if the English imperial gallon of 10 lbs. water is meant, a gallon could not weigh more than eight and a half lbs. Now 1000 cubic feet of coal gas of 14 candle pow, er weighs more than thirty pounds, and 1000 cubic ft. of hydrogen, the lightest substance known weighs about five and a quarter lbs. His 1000 feet of gas, therefore, if representing the whole gallon, would have to have a density less than double that of pure hydrogen; or, that of hydrogen being 0·0697 (Air=1.) this gas might be 0·113, or about one fourth the density of a fair coal gas. Now as the flows under given pressure, through a burner, are as the squares of the densities inversely; instead of burning "as long as 1000 feet of ordinary coal gas" 1000 feet of such a tenuous gas would flow out *sixteen times as fast* as the coal gas, or last but as long as about 63 feet of the latter.

Another chemical question that arises is how can such a light gas be obtained from the material. The gallon of naphtha contains altogether at the utmost but 15 per cent., or a pound and a half, say 286 cubic feet, of hydrogen. What makes up the other 714 feet of gas, which, if al the hydrogen is eliminated as such, must be some unknown and impossible gas having a density somewhere about

$$\frac{113-(286\times 0{\cdot}0697)}{714}=0{\cdot}133$$

More could we say, but *jam satis* we think. Will not our learned *confrers* admit that such statements, when endorsed by his own high authority, may work incalculable mischief, in disseminating the lying representations of wolfish speculators, among a public too ready to believe aught that chimes with their almost universal prejudices?

THE NEW EDITION OF WOOD'S "GUIDE TO GAS-LIGHTING."

Of this little work, by Alfred H. Wood, A.I.C.E., Engineer to the Hastings and St. Leonards Gas Co., and author of other works on Ventilation and Photometry, we have a copy through the kindness of T. C. Hopper, Esq., Superintendent of the American Meter Co. More than a month ago we made an effort to get a copy or two from England, which has so far miscarried; and we therefore owe especial thanks to Mr. Hopper's thoughtfulness. Mr. Wood calls his pamphlet a "Manual for Gas Consumers," and there can be no doubt of the usefulness of its contents to that class; but on a perusal of it, we must give it, in a scientific view, a higher rank than this; and have no hesitation in saying that no Superintendent or Engineer of a gas works should fail to procure it. What we mean is that it contains precise numerical results of some of Mr. Wood's own experiments, the value of which is not confined to consumers.

His tabulated results, for example, of the diameters needed, of service pipes of different lengths and for varying numbers of burners, founded on actual experiments, are certainly highly valuable in many points of view, and he gives also figures, in tabular form, of experiments on the familiar effect of increased pressure in destroying luminosity, which must interest all gas men, these experiments having been made both with Argand and fishtail burners. Other results are given, of the relative values, in candle-power, of differing consumptions or flows from the same burner and so forth; and we repeat, that no gas managers library will be complete without a copy of Mr. Wood's pamphlet.

The Editor takes this opportunity to say (in reply to very numerous inquiries) that the little work on gas consumption and distribution that he himself announced in September last, the completion of which has been greatly interrupted by imperative professional occupations, will now soon be in press. He also wishes to thank his friends for the wide and earnest encouragement he has received in this undertaking.

Prof. Henry Wurtz,

Scientific and Practical Chemist and Geologist.

26 PINE STREET, ROOM 36, NEW YORK.

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Geological Explorations and Reports—Chemical Analyses—Advice and Investigations in all the Chemical Arts—Chemical Inventions and Improvements made.

[Prof. W. makes a specialty of GAS CHEMISTRY, and the Analysis of Gas and Coals. Formerly Chemical Examiner in the U. S. Patent Office Practices as

Patent Agent, Counsel and Adviser

of INVENTORS, in all the CHEMICAL ARTS; for which his great general experience in these Arts, and his special experience inside the Patent Office, have qualified him to an unparalled degree.

Prof. WURTZ is Editor of the AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY, a journal whose circulation and patronage is among classes of the community of the highest position, influence and enterprise; and which furnishes therefore an unequalled medium for communication to the genera public, of valuable inventions and novel enterprises.

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A NEW INVENTION FOR LIGHTING STREETS.

Gas Engineers,

Gas Companies,

Officers Having Charge of Lighting the City,

Scientific Men,

and those who pay taxes for lighting our highways, are invited to examine a new invention, patented by M. B. DYOTT, which has the following points of excellence and superiority over all other means of street illumination. It doubles the power and efficiency of the gas used in it. One lantern with a 5 or 6 foot burner is superior to *four single top* lanterns, in which 3 or 3½ foot burners can only be used with safety (a larger burner will so heat the glass that rain will break it). It is an established fact, that one 5 foot burner will give more light than three that consume 3 feet each, or 9 feet of gas.

DYOTT'S patent **Luminous Reflecting Street Lamp** has a beautiful semi-transparent opaline PROTECTOR and REFLECTOR, which never loses its brilliancy, throws a softened light upon the upper portion of the buildings, and reflects the light, which is in all other lanterns wasted in lighting the sky, beneath, around, and where it is wanted. The top of our "CHAMPION LANTERN" being *double* the intervening air space, keeps the opaline dome cool, no matter what heat and light may be put in it, and cannot be broken by inclemency of the weather. Upon this semi-transparent dome is displayed the names of streets so distinctly, that they can be read at a great distance. The globe is egg-shaped—the strongest of formations. The lantern is so constructed, that three of them can be cleaned in the time required to clean one of the old style. They are made of copper, brass, and iron, and are ten times more durable than those now in use. Being the most durable and efficient, they are the most *economical*, and being the most beautiful, are an ornament to the city.

We are prepared to furnish these lamps, or to negotiate with Cities or Corporations, for the right to make and use them and will be pleased to furnish any information, and illustrated circulars, upon application personally or by letter to

M. B. DYOTT,
114 South Second Street,
Philadelphia, Pa.

Those who desire to participate in forming a Company to manufacture and handle this invention, or to purchase rights will address as above. 123

GEO. A. McILHENNY'S

PATENT

VACUUM PROCESS,

FOR RELIEVING GAS RETORTS FROM PRESSURE.

Patented in the United States and Great Britain, June 1867 first patent for this purpose in the United States (but not presented to the public until fully tested). Now in successfu operation for six years, with most satisfactory results.

The many devices lately brought to the notice of the American public, to accomplish the same results are mostly old English contrivances tried and abandoned years ago, on account of the machinery, stuffing boxes, valves, levers, etc., necessary

But the extraordinary results obtained by the McIlhenny process, have induced some unprincipled persons to bring to the notice of the public, as *recent inventions of their own*, some of these old devices; their purpose seems to be simply to evade the patent.

This process is not only safe, simple and effective, but costs little to apply. The only machinery necessary is a one and a half inch stop cock, and a half inch stop cock to each bench No alteration in the old system is required. In fact, a Works operated with this process, can at any time be operated on the old pressure system, simply by closing the two stop cocks above mentioned. There is nothing to get out of order, nothing that requires special attention; no stuffing-boxes to pack and keep tight, no valves to keep clear of tar and pitch, no levers to lubricate, and no expense for a great amount of machinery.

The McIlhenny process challenges the world as regards yield and quality of gas.

For particulars apply to GEO. A. McILHENNY, Engineer of the Washington Gas-Light Co., Washington, D. C., or to WILLIAM YORKE, Engineer of the Portland Gas-Light Co., Portland, Me., who will take pleasure in corresponding with any one interested. 307-1y

JESSE W STARR & SONS,

Camden Iron Works

Camden, New Jersey,

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses. Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS, for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves,

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

With cast iron guide and suspension frames. GAS GOVERNORS or REGULATORS, STREET MAINS, from 1½ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES, etc. STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 226-tf

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1½ to 48 inches diameter.

Cast Iron Flange Heating and Steam Pipe.

STOP VALVES FOR WATER OR GAS, ALL SIZES.

Fire Hydrants,

GAS HOLDERS,

TELESCOPIC OR SINGLE.

☞ Castings and Wrought Iron Work of all kinds for Gas Works. 253-6m

LIGHTING FIRES WITH COAL OIL.—That people will still continue to practice the dangerous feat of lighting fires with coal oil, notwithstanding the warnings of the press, and the continual recurrence of frightful accidents from that cause, betrays either an extraordinary amount of ignorance or temerity. Whilst coal oil itself is not in the the least degree explosive, the vapor of it—and which fills the upper part of every close vessel containing coal oil—is as explosive as nitro-glycerine. The moment this vapor comes in contact with a blaze it explodes, igniting the oil, and scattering it over everything around. If a small quantity of oil were first poured into a cup, and poured from that on the fire, the danger would not be great, but even then caution is required, for as soon as the oil becomes heated it forms into vapor very rapidly, and in a moment the stove is full of it, and if a lighted match be applied, an explosion takes place, sufficient sometimes to blow the stove to pieces.—*Exchange.*

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AMERICAN

GAS SCREEN MAN'F'G COMPANY.

TO GAS-LIGHT COMPANIES.

Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the Screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4te Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

LUTHER DAY, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of open space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yonrs,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respedtfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Dear Sir: We have had your Gas Trays in constant use for most one year and six months, and find them superior to y others we have ever used, both in point of economy and ficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

DWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years go, are getting somewhat worn. I wish to say here that I nsider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like e sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.
SPRINGFIELD, MASS., Oct. 10, 1871.

MR. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them, than with any other Screen we have used.

Yours respectfully,
THOMAS J. PISHOU.

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give you my experience.

Yours truly,
P. E. DEMILL. Secretary.

We give a list of some Gas-Light Companies using them.

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Address A. P. JAQUES, Treas.,
Amer. Gas Screen Man'f'g Co., Haverhill, Mass

DENNIS LONG & CO.,

Union Pipe Works,

Louisville Pipe Foundry,

AND

Union Foundry and Machine Shops,

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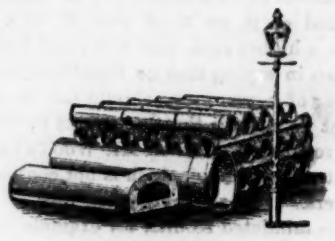

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Cast Iron Gas and Water Pipe,

All Pipe cast vertically in dry sand.

2 inch Pipes in 8 feet lengths. 3 inch to 60 inch cast in 12 feet lengths.

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GAS-HOLDERS.

And every description of work necessary for Gas or Water Companies.

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ARCHITECT AND GENERAL GAS ENGINEER,

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WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS and other buildings. Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity, Retort Settings, Condensers, Washers, Exhausters, Purifiers, Holders, Coal Hoisting Apparatus, Iron Roofs, and every description of Machinery required in the Manufacturing of Gas.

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SAMUEL DOWN, President American Meter Company, N. Y.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
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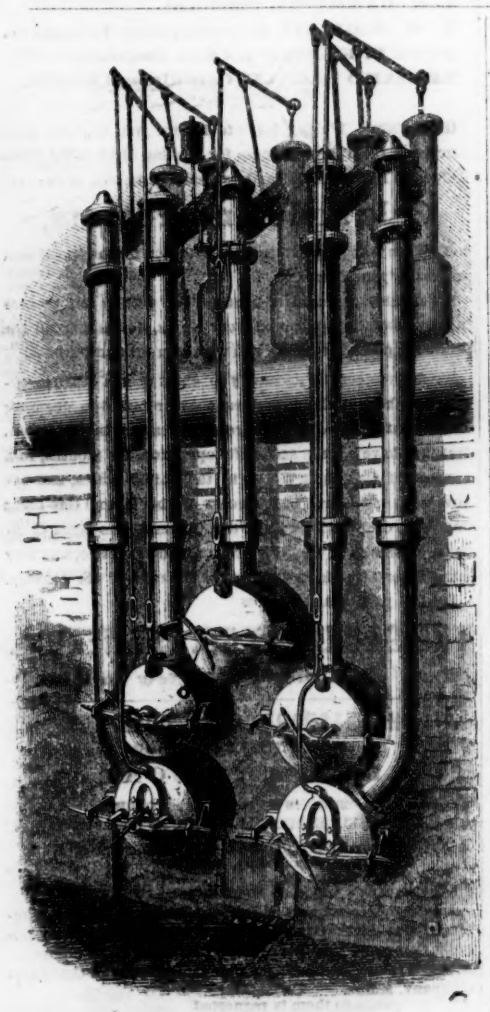
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [254-



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The Seal closes automatically, when the retort-lid is removed, and is broken by replacing the lid. No mistake can possibly be made. The rods are adjustable in a moment to any contingency. The new attachments are adaptable to any Works. Cost only that of rough castings. No lute used, and no leakage at lids. Half the number of lids only needed. Capacity of mains greatly increased. In new Works no mains. No carbon in retorts, seldom in stand-pipes. Addre

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[206ur]

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I am now prepared to place in the market, through my agencies as below, a regular and unlimited supply of this valuable Cannel, for gas purposes. A recent analysis, by Prof. WURTZ, Editor of this Journal, at the Laboratories of the NEW YORK GAS-LIGHT COMPANY, gave 47½ per cent of Volatile Matter and 45 bushels to the ton of a fair quality of coke. The yield of gas was at the rate of 9,500 feet per ton of about 27 candle power. It is not highly sulphurous, can be purified by Lime, and the ash from the coke does not clinker.

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SEVERAL CONTRIVANCES HAVING BEEN DEVISED for the purpose of dispensing with the dip-pipe seal, by means of a valve, or cut-off, between the retort and the hydraulic main, in gas works, since this method of making gas was introduced by the AMERICAN COAL GAS LIGHT IMPROVEMENT COMPANY, all of which are infringements upon Letters Patent, numbered 95,459—116,450—and 119,135, owned by said Company. All Gas-Light Companies are cautioned against the use, without license or authority from the undersigned, of said devices.

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We are now prepared to contract for this class of Castings under the most favorable terms.

We have associated with us Mr. H. G. H. TARR, formerly with R. D. WOOD & Co., who will take charge of our sales department in New York. 262-1y

GEO. STACEY. HENRY CRANSHAW. WM. STACEH.

GEO. STACEY & CO.,
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908-6m Bergen Point N. J.

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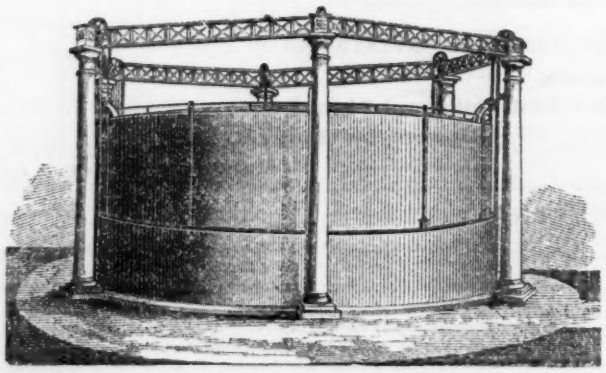
COAL CARS, PURIFYING BOXES, COKE BARROWS.



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Particular Attention paid to Alterations and Repairs.

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☞ GAS WORKS CASTINGS OF ALL KINDS.

251-6m

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MANUFACTURERS OF

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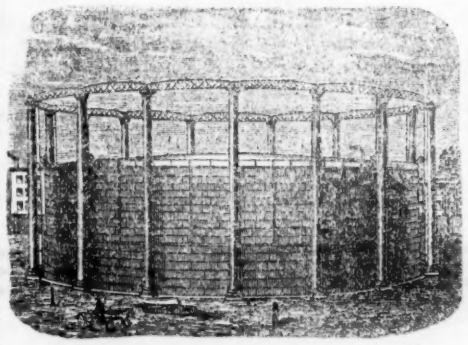

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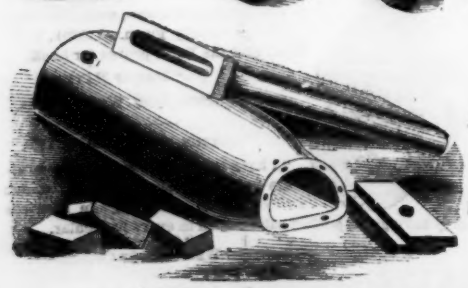

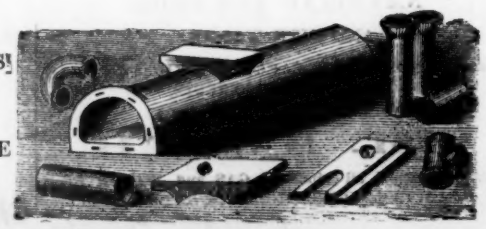

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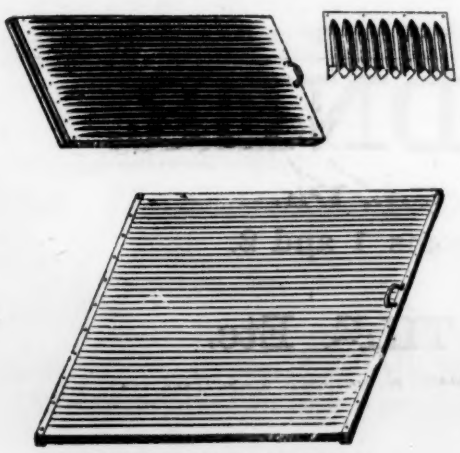

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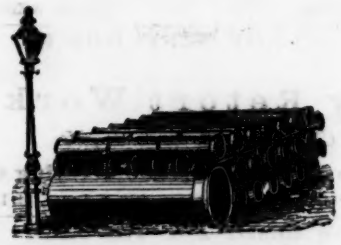

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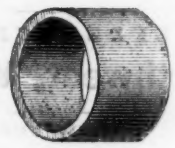

FIG. 2.

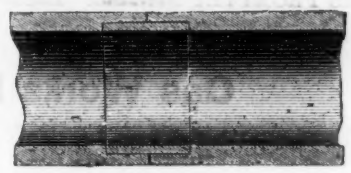

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

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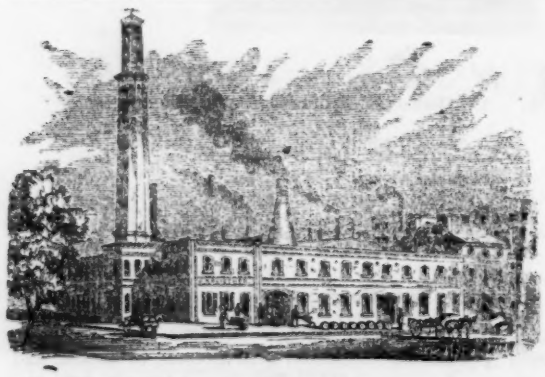

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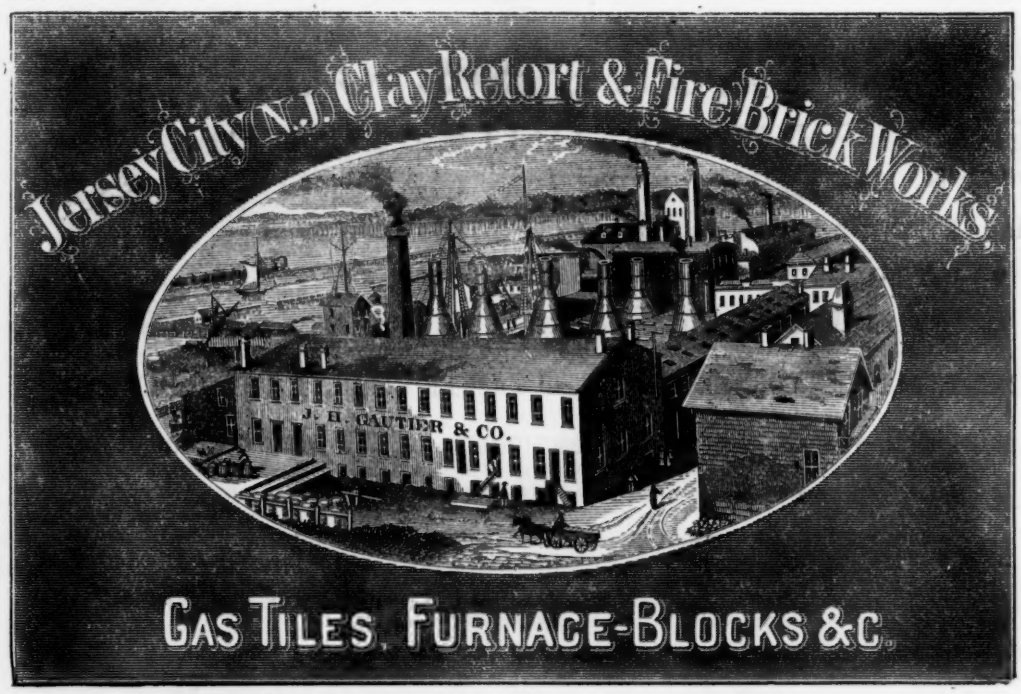

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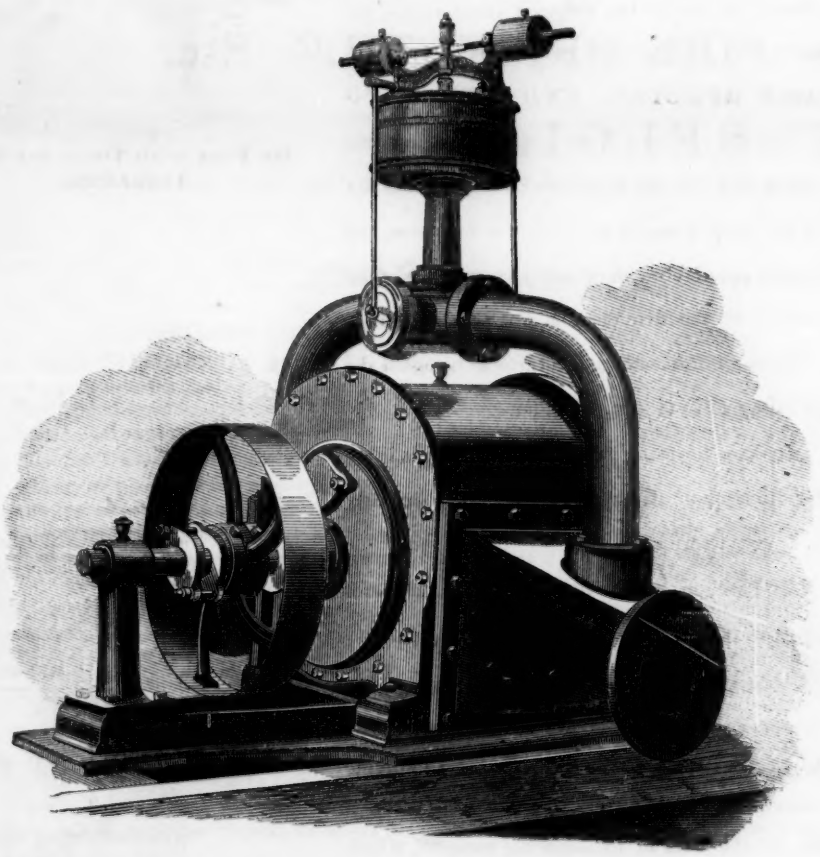

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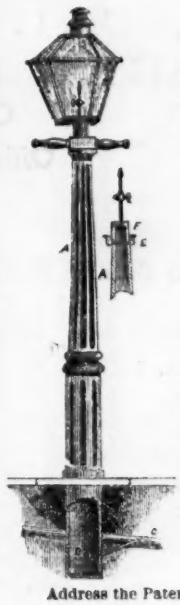

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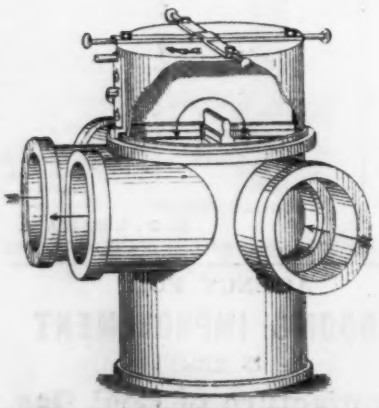

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No. 2 is a By-Pass for using two apparatus, the gas is entered and the direction of its current is controlled similarly to that of No. 1, just described.

No. 3 is a By-Pass for passing the gas around the meter or not, according to the set of the loose or circular valve.

No. 4 is a sectional view of No. 3, and fully illustrates the construction and arrangement of the various By-Passes; the vertical partitions P are placed at right angles and divide the By-Pass into four drip chambers, they extend to within a short distance of the bottom to allow the water W, which forms the water seal, to circulate freely; the valve V is constructed with a diaphragm which divides it diametrically, the edges from ground joints with the upper edges of the partitions P, to prevent the gas from leaking from one chamber to another, and also to protect the ground surfaces from the corrosive action of the gas.

No. 5 is a single By-Pass with Drip Chambers.

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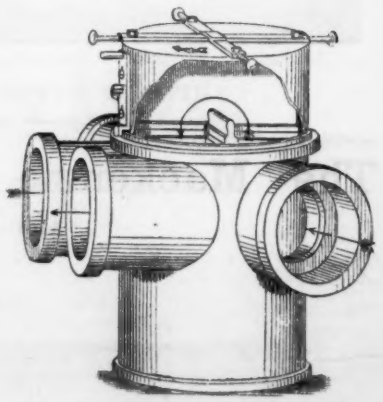

By Pass with Drips for two Apparatus.

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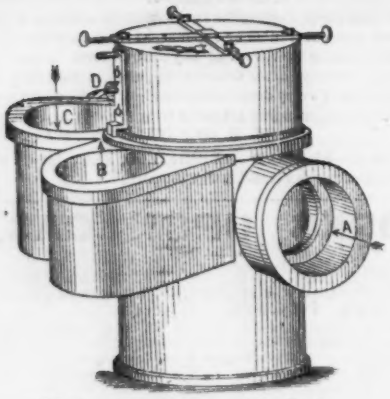

Meter By Pass with Drip.

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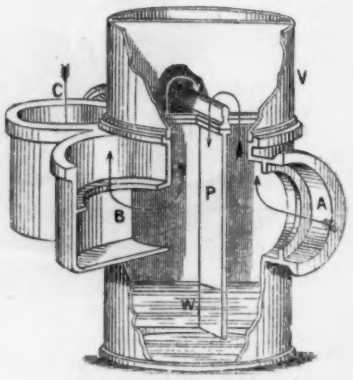

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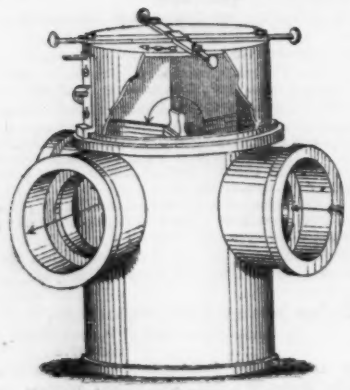

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